

Gadoids per hour caught by demersal trawl in the North Sea

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Contents

Summary	4
1 Introduction	5
2 Assignment	5
3 Materials and Methods	5
4 Results	6
4.1 Total landings	6
4.2 Cod	6
4.2.1 Beam trawlers >2000hp	6
4.2.2 Otter trawlers	6
4.3 Whiting	6
4.3.1 Beam trawlers >2000hp	6
4.3.2 Otter trawlers	7
4.4 Landings and discards from the Discard Programme	7
4.4.1 Beam trawlers > 2000hp	7
4.4.2 Otter trawlers	9
5 Conclusions	10
6 Quality Assurance	11
Justification	12
Appendix A. Figures an Tables	13

Summary

In this project we summarise the numbers of gadoids landed by the Dutch beam trawl and otter trawl fleet in 2007 and 2008. We then make the best estimates possible of discarded numbers using data from our Discard Sampling Programme. These data will be used in negotiations between Norway and the EU to decide sample sizes for the possible implementation of 'Real Time Closures' in the North Sea and Skagerak.

1 Introduction

In light of negotiations between the EU and Norway regarding the implementation of Real Time Closures to protect gadoids in the North Sea and Skagerak the Dutch Ministry of Fisheries asked Wageningen-IMARES to investigate the amounts of gadoids caught per hour by the Dutch fishing fleets active in these areas.

2 Assignment

The Dutch Ministry Department of Fisheries request Wageningen IMARES to estimate the numbers of cod, whiting, haddock and saithe per hour trawled for the Dutch beam trawl and otter trawl fisheries in the North Sea and Skagerak for the two most recent years (2007 and 2008).

3 Materials and Methods

Landings (in weight) and effort data were obtained from log-book information in the in-house database VISSTAT. These data contain landings and effort based on trips for all fishing boats with Dutch registrations. We wrote SQL queries to extract the data needed and used R (<http://cran.r-project.org/>) and SASTM for further statistical analyses and plotting. The discard data were also obtained from another Wageningen-IMARES database (FRISBE) which has been constructed as part of the national implementation of the DCR¹ programme. Preliminary data explorations showed that very few haddock (*Melanogrammus aeglefinus*) or saithe (*Pollachius virens*) were either landed or discarded, or in extremely low amounts, by these two Dutch fleets and we decided, therefore, to focus our investigations on cod (*Gadus morhua*) and whiting (*Merlangius merlangus*). Numbers caught were unavailable from the landings data so those are summarised in terms of weights (kg) while the discarded fish are summarised in terms of numbers. Discard weights are based on length weight relations.

¹ Data Collection Regulations Regulation (EC) Nr. 199/2008 of the Council of the 25th of February 2008.

4 Results

4.1 Total landings

In this section we describe the total landings by two segments of the Dutch fleet, beam trawlers >2000hp and otter trawlers targeting *Nephrops*. It should be noted that catch rates reported are here are based on two different data sources. We first summarise the total landings made by the fishery, ie we sum all the fish caught by the relevant fleet in its entirety over each year and divide that number by the total hours spent at sea by that fleet. Secondly we report catch rates obtained only from trips sampled during the discard programme. These data represent are much smaller (<1%) subset of all the total fishing activity with patchy seasonal coverage. Nevertheless you might expect these numbers to be of the same order of magnitude which is indeed the case (Tables 1, 2, 3 & 4).

4.2 Cod

4.2.1 Beam trawlers >2000hp

Total cod landings by the Dutch Beam trawl fleet >2000hp in 2007 and 2008 were 471 and 421 tonnes respectively. Total fishing effort (hours at sea) was 171,667 hours in 2007 and 113,560 in 2008. This translates to mean catch rates of 2.7 kgs h⁻¹ in 2007 and 3.7kgs per h⁻¹ in 2008. Seasonal changes in landings into Dutch ports (kgs h⁻¹) of cod by this fleet are summarised in Figure 1. Landings are focused on the more southerly ports of Breskens, Scheveningen, and Vlissingen and they are strongly seasonal with both catch rates and overall landings in January typically the highest. Nevertheless it should be noted that cod is landed year-round into Vlissingen (Fig. 1).

4.2.2 Otter trawlers

Landings of cod by the Dutch otter trawlers targeting *Nephrops* were a little lower with 326 tonnes reported in 2007 and 505 tonnes in 2008. Fishing effort was 92115 hours at sea in 2007 and 103151 in 2008. These figures correspond to rates higher than estimated for the large beamers (see above) at 3.5 kgs h⁻¹ (2007) and 4.9kgs h⁻¹ (2008). Again (Fig. 2) landings of cod are seasonal with the winter months of January and December being the most important. Proportionally less cod are landed in summertime for this fleet than is the case for the large beamers presumably because cod move offshore in summer and are less likely to be caught by this generally smaller fleet.

4.3 Whiting

4.3.1 Beam trawlers >2000hp

At total of 294 tonnes of whiting were landed in 2007 and 203 tonnes in 2008. Combining these figures with the effort estimates (above) gives catch rates for whiting of 1.7 and 1.8 kg h⁻¹ in 2007 and 2008 respectively. The southerly ports (Breskens and Vlissingen) are the most important for whiting (Fig.3). Like cod, the large beamers catch more of this species in winter although there appears to be more of a clearly defined trough in August (see Vlissingen; Fig. 3) than was the case for cod (Fig. 1).

4.3.2 Otter trawlers

Landings of whiting by otter trawlers targeting *Nephrops* were reported as 230 tonnes in 2007 and 204 tonnes in 2008. Overall catch rates were higher for this fleet than for those estimated for the large beamers at 2.5 kg h⁻¹ (2007) and 2.0 kg h⁻¹ (2008). IJmuiden has the highest landings of whiting by this fleet (see Fig. 4) but in contrast to the pattern for the fleets described above the spring (April) and autumn (October) had the highest catch rates.

4.4 Landings and discards from the Discard Programme

4.4.1 Beam trawlers > 2000hp

In 2007 and 2008 nineteen commercial fishing trips by beamers >2000hp were observed. The mean number of cod discarded was 0.61 kg h⁻¹ for mean landings of 1.82 kg h⁻¹ (Table 1). The data for whiting are shown in Table 2. Between 2007 and 2008 an average of 0.34 kg h⁻¹ was landed and 2.85 kg h⁻¹ were discarded.

Table 1. Cod landings and discards for the observed trips in 2007 and 2008 (Beam trawl > 2000hp). Note: Total land = total landings (kgs) each trip; Duration= number of hours the vessel was at sea; Total discard = total number of discarded fish; Land/hour = weight (kgs) landed per hour at sea; Discard/hour = weight (kgs) discarded per hour at sea. For number of discards per hour see table 1b in appendix.

Trip ID	Year	Total land (kg)	Duration (hours)	Total discard (kg)	Land/ hour (kg)	Discard/ hour (kg)
81	2007	377	77.08	74	4.89	0.96
82		70	74.75	0	0.93	0.00
83		100	80.50	20	1.24	0.25
84		4	84.58	13	0.05	0.15
85		3	75.50	0	0.04	0.00
86		76	75.50	0	1.01	0.00
87		141	61.25	42	2.30	0.69
88		23	76.25	7	0.30	0.09
89		188	82.25	0	2.29	0.00
90		380	77.75	31	4.89	0.40
94	2008	40	66.00	1	0.61	0.02
95		50	82.67	420	0.60	5.08
97		92	87.92	220	1.05	2.50
98		189	85.58	112	2.21	1.31
102		544	75.42	0	7.21	0.00
103		41	95.50	0	0.43	0.00
104		39	74.58	0	0.52	0.00
105		26	71.70	0	0.36	0.00
106		278	77.42	8	3.59	0.10

Table 2. Whiting discards and landings of observed trips in 2007 and 2008 (Beam trawl > 2000hp) Note: Total land = total landings (kgs) each trip; duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Land/hour = weight (kgs) landed per hour at sea; Discard/hour = weight (kgs) discarded per hour at sea. For number of discards per hour see table 2b in appendix.

Trip ID	Year	Total land (kg)	Duration (hours)	Total discard (kg)	Land/ hour (kg)	Discard/ hour (kg)
81	2007	172	77.08	1101	2.23	14.28
82		21	74.75	25	0.28	0.33
83		0	80.50	60	0.00	0.75
84		22	84.58	69	0.26	0.82
85		2	75.50	5	0.03	0.07
86		4	75.50	1	0.05	0.01
87		3	61.25	92	0.05	1.50
88		1	76.25	254	0.01	3.33
89		97	82.25	416	1.18	5.06
90		14	77.75	164	0.18	2.11
94	2008	7	66.00	150	0.11	2.27
95		49	82.67	682	0.59	8.25
97		25	87.92	142	0.28	1.62
98		40	85.58	215	0.47	2.51
102		14	75.42	110	0.19	1.46
103		0	95.50	51	0.00	0.53
104		0	74.58	70	0.00	0.94
105		3	71.70	267	0.04	3.72
106		40	77.42	360	0.51	4.65

4.4.2 Otter trawlers

Six commercial trips by otter trawlers targeting *Nephrops* were sampled between 2007 and 2008 (Tables 3 and 4). Catch rates of both cod and whiting were slightly higher for the otter trawlers than we observed for the beamers with mean landing rates of 4.29 kgs h⁻¹ and 0.82 kgs h⁻¹ discarded for cod. For whiting discarding in this fleet was quite high with mean rates of 7. kgs h⁻¹ discarded at sea. Mean landings of this species were 0.59 kgs h⁻¹.

Table 3. Cod landings and discards from observed trips 2007-2008 (Otter trawlers targeting Nephrops) Note: Total land = total landings (kgs) each trip; duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Land/hour = weight (kgs) landed per hour at sea; Discard/hour = weight (kgs) discarded per hour at sea. For number of discards per hour see table 3b in appendix.

Trip ID	Year	Total land (kg)	Duration (hours)	Total discard (kg)	Land/hour (kg)	Discard/hour (kg)
91	2007	245	58.00	46	4.22	0.79
92		15	40.42	0	0.37	0.00
93		101	65.00	56	1.55	0.86
99	2008	670	72.00	114	9.31	1.58
100		731	71.00	111	10.29	1.56
101		0	137.25	15	0	0.11

Table 4. Whiting landings and discards from observed trips 2007-2008 (Otter trawlers targeting Nephrops) Note: Total land = total landings (kgs) each trip; duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Land/hour = weight (kgs) landed per hour at sea; Discard/hour = weight (kgs) discarded per hour at sea. For number of discards per hour see table 4b in appendix.

Trip ID	Year	Total land (kg)	Duration (hours)	Total discard (kg)	Land/hour (kg)	Discard/hour (kg)
91	2007	19	58	229	0.32	3.95
92		0	40.42	44	0.00	1.09
93		0	65	153	0.00	2.35
99	2008	95	72	816	1.32	11.33
100		86	71	567	1.21	7.99
101		96	137.25	2117	0.70	15.42

5 Conclusions

Wageningen IMARES aims to conduct ten discard observer trips per year for the beam trawl fleet >2000hp targeting for flatfish and three to four trips per year for otter trawlers targeting *Nephrops*. This level of sampling corresponds to <1% of the trips made by these fleets. This low level of sampling effort for discards should be kept in mind when interpreting data of bycatch which appear at low numbers in the catch.

Total landings of cod and whiting by the Dutch fleets are actually very low when considered in terms of their main target species (sole, *Nephrops* and plaice) and landing of gadoids by other European fleets.

The southerly ports (Breskens and Vlissingen) are most important for gadoids landings (cod and whiting) regarding the Dutch beamer fleet (figure 1 and 2).

Quantities of cod and whiting discards have been consistently low in all sampled catches of both fisheries in both years. Therefore, we can conclude with certainty that catch rates of both cod and whiting are presently at a low level in these fisheries.

Catch rates of both cod and whiting were slightly higher for the otter trawlers than we observed for the beamers. Whiting discards are higher for the otter trawl vessels sampled in 2008 than the discards we found for 2007.

6 Quality Assurance

IMARES utilises an ISO 9001:2000 certified quality management system (certificate number: 08602-2004-AQ-ROT-RvA). This certificate is valid until 15 December 2009. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V. Furthermore, the chemical laboratory of the Environmental Division has NEN-AND-ISO/IEC 17025:2005 accreditation for test laboratories with number L097. This accreditation is valid until 27 March 2009 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation, with the last inspection being held on the 5th of October 2007.

Justification

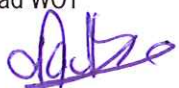
Rapport C057/09

Project Number: 4301100301

The scientific quality of this report has been peer reviewed by the a colleague scientist and the head of the department of Wageningen IMARES.

Approved: Drs. F.A. van Beek
Head WOT

Signature:



Date: 11 juni 2009

Approved: Dr. T. Bult
Head Fisheries

Signature:



Date: 11 juni 2009

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Number of graphs:	0
Number of appendix attachments:	1

Appendix A. Figures an Tables

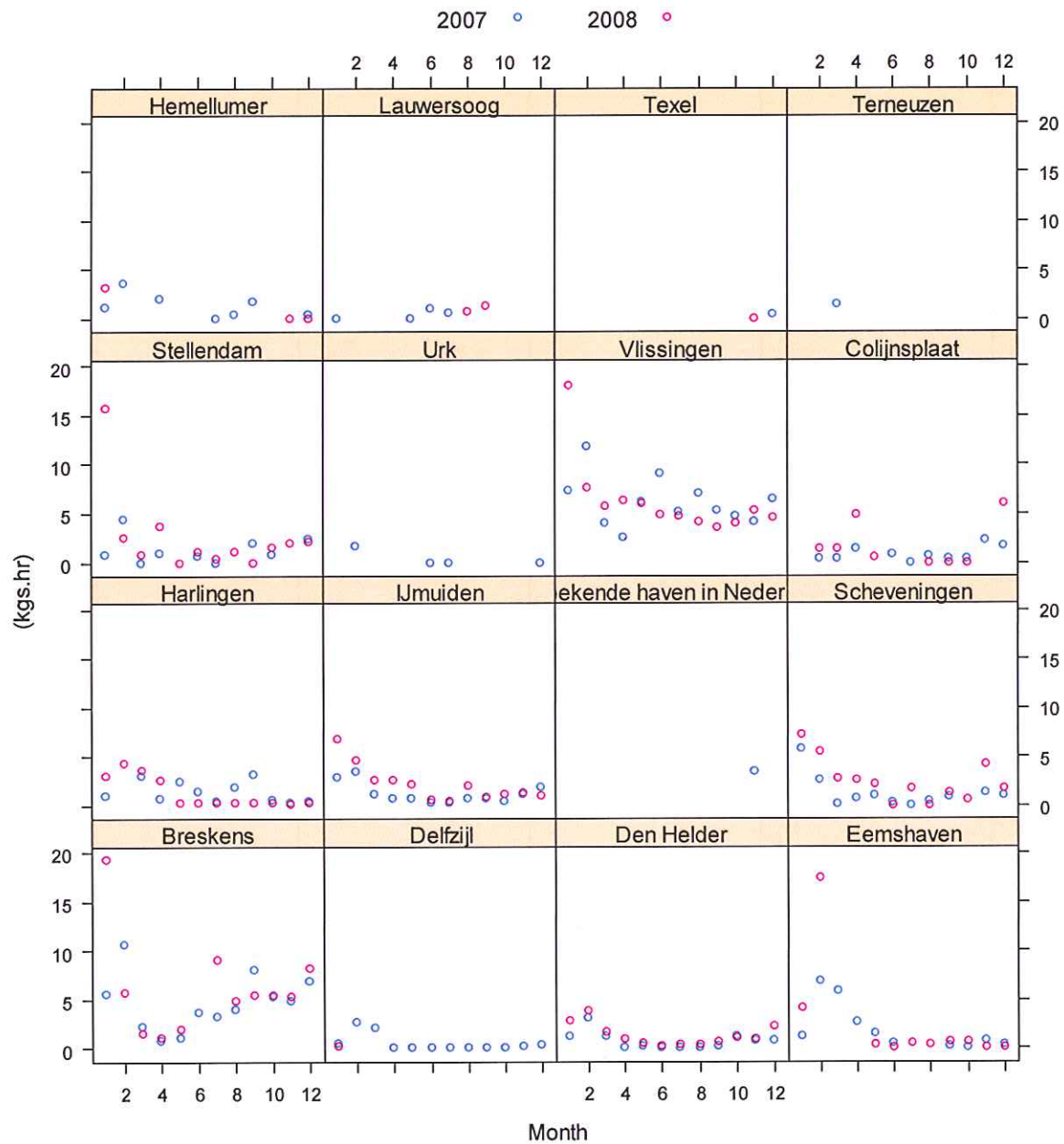


Figure 1. Seasonal change in landings (kg h⁻¹) of cod by the Dutch Beam Trawl Fleet (>2000hp) in 2007 and 2008 split by landing port.

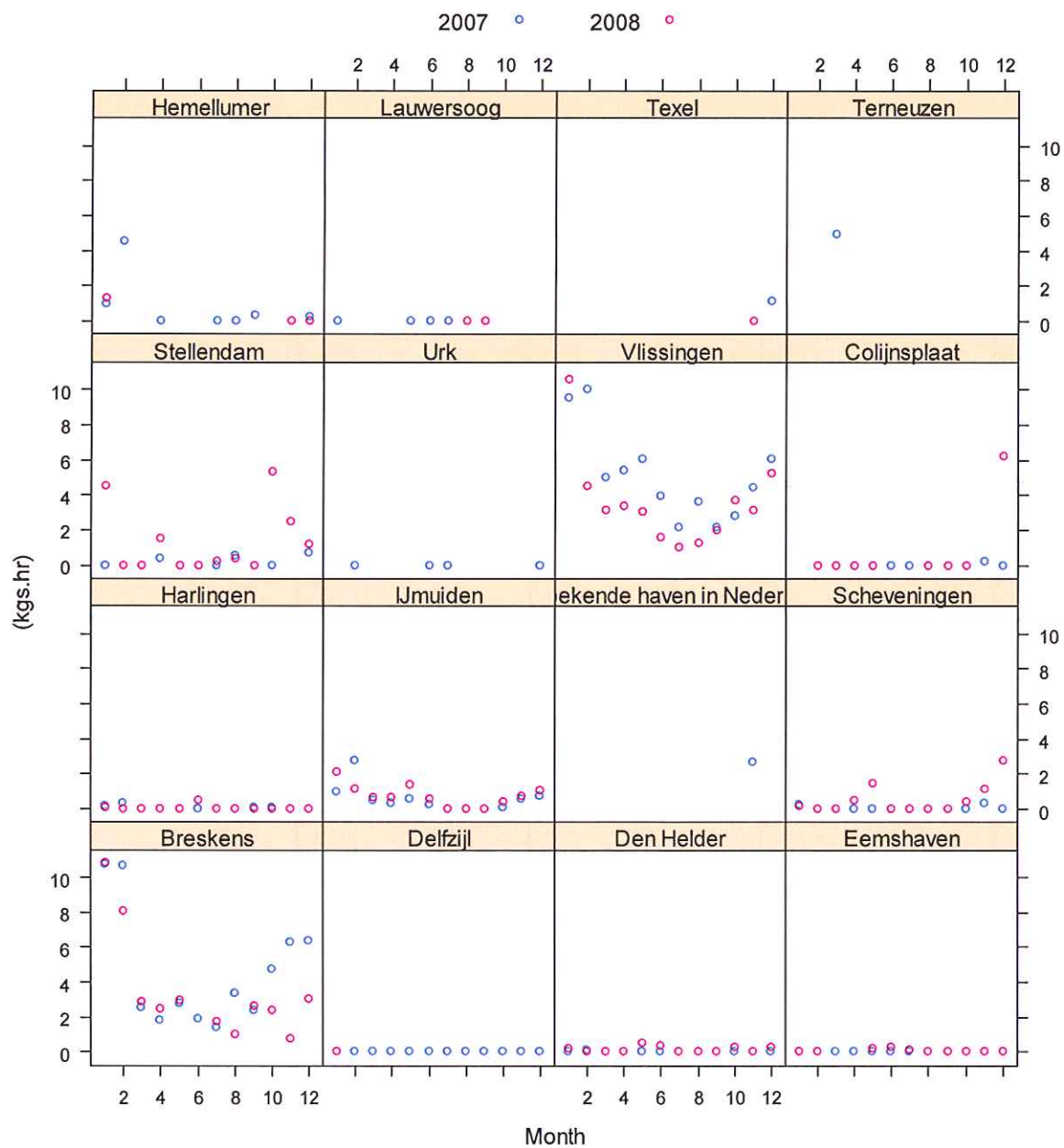


Figure 2. Seasonal change in landings (kg h⁻¹) of whiting by the Dutch Beam Trawl Fleet (>2000hp) in the years 2007 and 2008 split by landing port.

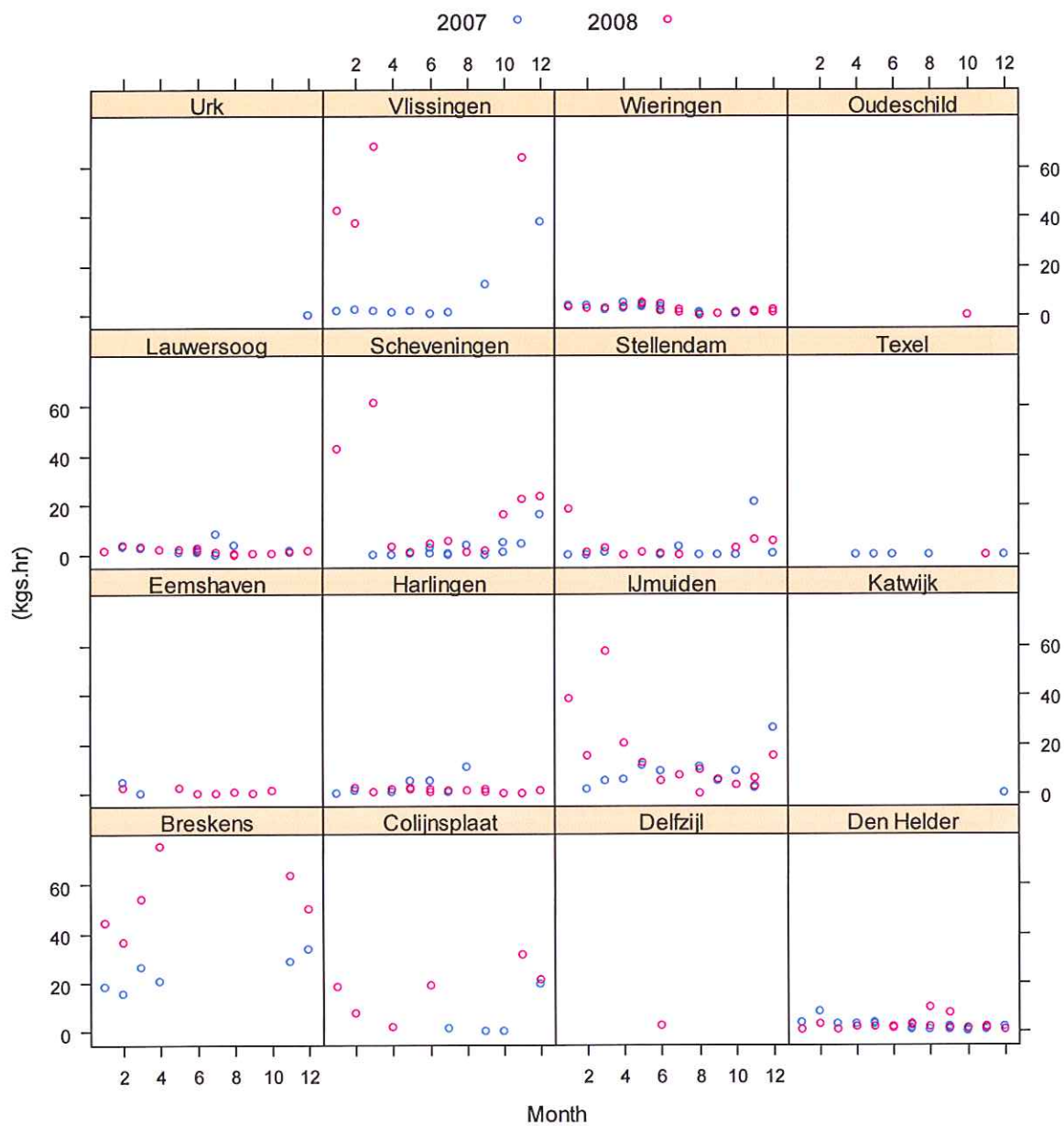


Figure 3. Seasonal change in landings (kg h⁻¹) of cod by the Dutch Otter Trawl fleet targeting Nephrops in 2007 and 2008 split by landing port.

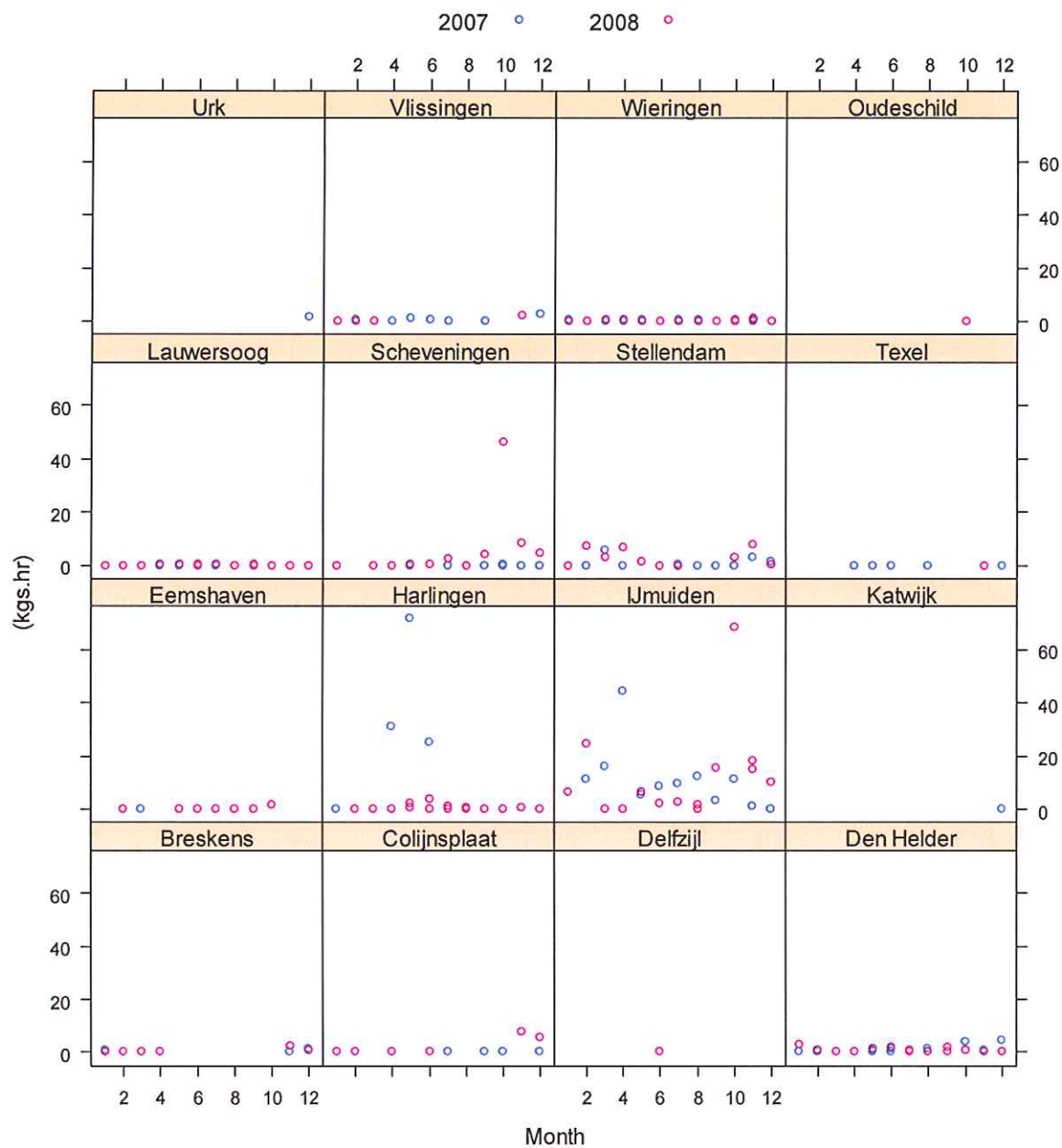


Figure 4. Seasonal change in landings (kg h⁻¹) of whiting by the Dutch Otter Trawl fleet in 2007 and 2008 split by landing port.

Table 1b. Cod discards for the observed trips in 2007 and 2008 (Beam trawl > 2000hp). Note: Duration= number of hours the vessel was at sea; Total discard = total number of discarded fish; Discard/hour = number discarded per hour at sea.

Trip ID	Year	Duration (hours)	Total discard (#)	Discard/ hour (#)
81	2007	77.08	786	10.20
82		74.75	0	0
83		80.5	82	1.02
84		84.58	81	0.96
85		75.5	0	0
86		75.5	0	0
87		61.25	136	2.22
88		76.25	286	3.75
89		82.25	0	0
90		77.75	194	2.50
94	2008	66	25	0.38
95		82.67	2648	32.03
97		87.92	1306	14.85
98		85.58	456	5.33
102		75.42	0	0
103		95.5	0	0
104		74.58	73	0.98
105		71.7	0	0
106		77.42	23	0.30

Table 2b. Whiting discards of observed trips in 2007 and 2008 (Beam trawl > 2000hp) Note: Duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Discard/hour = number discarded per hour at sea.

Trip ID	Year	Duration (hours)	Total discard (#)	Discard/ hour (#)
81	2007	77.08	15144	196.47
82		74.75	456	6.10
83		80.5	785	9.75
84		84.58	1065	12.59
85		75.5	72	0.95
86		75.5	161	2.13
87		61.25	1028	16.78
88		76.25	9206	120.73
89		82.25	3985	48.45
90		77.75	3310	42.57
94	2008	66	1979	29.99
95		82.67	7659	92.65
97		87.92	1897	21.58
98		85.58	2349	27.45
102		75.42	1143	15.16
103		95.5	1296	13.57
104		74.58	1264	16.95
105		71.7	3603	50.25
106		77.42	4082	52.73

Table 3b. Cod discards from observed trips 2007 2008 (Otter trawlers targeting Nephrops) Note: Duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Discard/hour = number discarded per hour at sea.

Trip ID	Year	Duration (hours)	Total discard (#)	Discard/ hour (#)
91	2007	58	186	1.177
92		40.42	0	0
93		65	383	5.9
99	2008	72	549	6.1
100		71	495	7.6
101		137.25	51	0.37

Table 4b. Whiting discards from observed trips 2007-2008 (Otter trawlers targeting Nephrops) Note: Duration = number of hours the vessel was at sea; Total discard = total number of discarded fish; Discard/hour = number discarded per hour at sea.

Trip ID	Year	Duration (hours)	Total discard (#)	Discard/ hour (#)
91	2007	58	2661	45.9
92		40.42	603	14.92
93		65	3664	56.4
99	2008	72	13990	194.3
100		71	8924	125.7
101		137.25	24811	180.1

